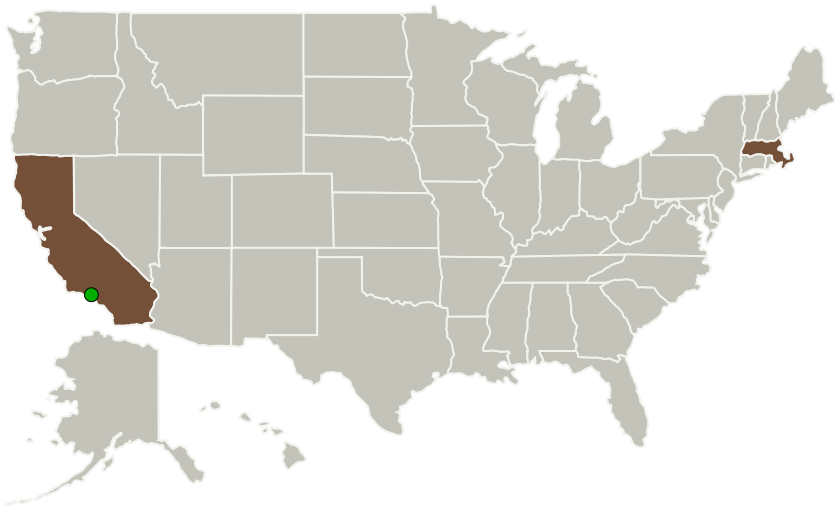
SPHERES MOSR Rendezvous and Docking with the OS (RDOS), Phase I

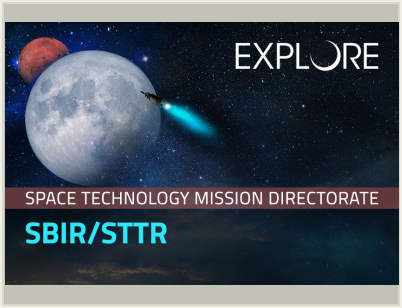
Completed Technology Project (2010 - 2010)

Project Introduction

NASA's Mars Sample Return (MSR) mission involves many challenging operations. One of the highest-risk operations is the guidance of the Orbiting Sample (OS) into the capture mechanism on the MSR Orbiter/Earth Return Vehicle (ERV). Aurora Flight Sciences, and its research partner the Massachusetts Institute of Technology (MIT) Space Systems Laboratory (SSL), propose to adapt and augment the Synchronized Position Hold Engage Reorient Experimental Satellites (SPHERES) Mars Orbiting Sample Retrieval MOSR testbed to incorporate optically-guided rendezvous and docking with the OS (RDOS). This additional functionality will extend the MOSR testbed's existing capabilities to further support MSR rendezvous and capture algorithm development. With these new capabilities, the MOSR RDOS system would extend the utility of the MOSR testbed from the "last meter" problem focusing largely on the contact dynamics between the OS and the capture mechanism , but not addressing GN&C to the "last several meters", which involve significant time-critical maneuvers by the chaser in order to ensure that the OS is captured and, most importantly, that the contact dynamics between OS and capture mechanism neither cause the OS to become dislodged from the capture mechanism nor cause any structural damage to the OS itself.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Massachusetts

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Summary: SPHERES MOSR Rendezvous and Docking with the OS (R DOS), Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/140050)*

Project Management

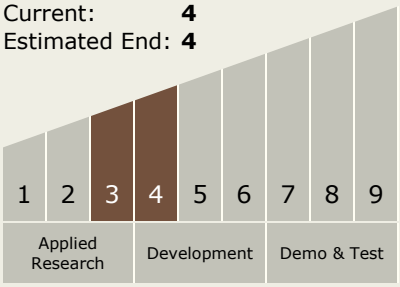
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Joseph Parrish

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.5 Autonomous Rendezvous and Docking
    - TX04.5.5 Capture Mechanisms and Fixtures

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System